

SCIENCE

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THE ETRUSCAN-PELASGIAN PROBLEM.¹

IN the wavering twilight of the dawn of history a mysterious people is dimly discerned, occupying the peninsula of Greece, — the Pelasgians; and another, seen somewhat more clearly, owning or controlling the central districts of Italy, — the Etruscans.

Erudition has been exhausted with arguments as to the relationship of these peoples to others better known. Volumes have been written to prove them Aryans, Turanians, Semites, Egyptians, Iberians, Celts, and what not?

To both is assigned a singular degree of culture, and this with such certainty that we cannot deny that the mighty walls of Tiryns and Fiesole, the delicate gold-work from the tombs of Chiusi, and the exquisite alabasters from the cemeteries of Volterra, remain to us as achievements in art and architecture before which any thing accomplished in the same direction by Greek or Roman holds the second place.

Nor were the Etruscans, at least, an illiterate people, or negligent of the holy duty of setting down in permanent records the great and good deeds of the departed. They were indeed "most careful chief in that." Of the something more than six thousand inscriptions in their tongue and alphabet which we already have in hand, five-sixths of them are epitaphs or mortuary comments.

Yet with all this store of material, with many inscriptions bilingual, — Etruscan and Latin, — and with numerous descriptions in classic writers, we do not know, beyond peradventure, the meaning of a single word in the Etruscan language. What a fine field, therefore, for learned speculations!

Several such are before us. Dr. Hesselmeier, already favorably known from an earlier archæological study, "*Die Ursprünge der Stadt Pergamos*" (1885), offers his solution of the problem by identifying the Etruscans and Pelasgians as members of the same linguistic family, which family he very positively decides belonged neither to the Indo-Germanic (Aryan), nor Semitic nor Turanian, branches of the human species. Further than this negative position, he will not advance, and denies the possibility of so doing, with our present knowledge. His identification of the Pelasgians with the Etruscans rests chiefly on the famous "inscription of Lemnos," — an inscribed slab found on that island, undoubtedly Etruscan in origin, and dating from the sixth century B.C. Furthermore, a number of proper names, especially in the Ionian dialect of Greek, point, he contends, to an admixture of the language in early days with another of Etruscan character.

The most original part of Hesselmeier's study is his tracing the migrations of the Pelasgo-Etruscans. The trend he finds was certainly from west to east, and from the seacoast toward the interior. Their colonies reached the shores of

Asia Minor at a very early day, and their stations there led some of the Greek historians to believe the original home of the "Tyrrhenians" (as they were also called) was somewhere to the east. As Karl Otfried Müller has abundantly shown in his classical work, "*Die Etrusker*," the Etruscans themselves repudiated any such origin, and by their most ancient traditions claimed to have reached Italian soil by sea, from the south.

Although the leading German authorities wholly disregard this venerable legend, and insist that the ancestors of the Etruscans came across the Alps from some land to the north, an American scholar has recently insisted not less vigorously that the old legend is true, and has boldly connected it with a previously unthought-of origin of the Etruscans. As the result of his travels in ancient Numidia, now the French colony of Algiers, and ancient Etruria, the modern Tuscany, Dr. D. G. Brinton has developed the theory that the Etruscans were originally a Numidian or Libyan colony, allied in language to the ancestors of the modern Kabyles or Berbers, — a race who, at the dawn of history, occupied the whole of North Africa, from the Nile valley to the Atlantic Ocean.

His arguments, if not especially weighty on any one point, make amends by their diversity. They include the physical character, in reference to which he makes both Etruscans and Berbers tall and blond, to the confusion of our ordinary notions of both these peoples; their traditions; their political institutions; their culture; and, finally, their language. To the last named he gives particular attention, availing himself of the little-known Numidian inscriptions in the "tiffinagh" alphabet, dating from about 200 B.C. Perhaps the most striking of his identifications is his interpretation of the Etruscan name of Servius Tullius, — "Mas-tarna." This appears to be clearly Numidian, and to mean "great conqueror."

Although Dr. C. Pauli of Leipzig, without doubt the most eminent "Etruscologist" now living, has entirely abandoned the Aryan or Indo-Germanic relationship of the Etruscan language, yet in the last year this effete hypothesis has again been advanced, with new arguments. Dr. Bugge, a learned Norwegian, has developed a suggestion offered thirty years ago by the late Dr. Robert Ellis of London, that the Etruscan was an Armenian dialect; and the odd combination of the president of the Royal Society of Literature, Sir Patrick Colquhoun, and the Turkish governor-general of the Libanus, Pasco Wassa Pacha, have appeared jointly in favor of identifying the Pelasgians with the Illyrians, the ancestors of the modern Albanians, who are also a member of the Aryan, or, as Penka prefers to call it, the "Aryac" family.

From the agreeable variety of these various learned solutions of the problem, all coming out within a twelve-month, it is quite evident that there is abundant chance yet for the learned to sharpen their wits on this much-vexed question.

¹ Dr. ELLIS HESSELMAYER, *Die Pelasgerfrage und ihre Lösbarkeit* (Tübingen, 1890); Dr. SAPHUS BUGGE, *Etruscan and Armenian Researches in Comparative Language* (Christiania, 1890); Dr. D. G. BRINTON, *Etruscan and Libyan Names. A Comparative Study* (Philadelphia, 1890); Sir PATRICK COLQUHOUN and H. E. WASSA PACHA, "The Pelasgi and their Modern Descendants," 1891 (*Asiatic Quarterly Review*).

DR. DOREMUS has recently found, according to *The Engineering and Mining Journal* of Feb. 7, that sodium fluoride and other fluorides can be used with advantage for softening hard waters.

HEALTH MATTERS.

An Industrial Use of Microbes.

DR. NEILSON of Norway says that the Norwegian fisher-folk have for more than five hundred years used pathogenic bacteria in catching whales. A few miles from the town of Bergen there is a narrow inlet of the sea, into the mouth of which whales make their way every season. As related in the *Sanitary Inspector*, when a whale is discovered in this place, the alarm is given, and the fishermen put out in their boats, drive the whale farther up the narrow bay, and stretch a net across the mouth of the inlet. Through this the monster could easily break, but he does not. Then they proceed to capture him and bring him to land. The animal, however, is twenty or thirty feet long and very strong, and with their primitive implements alone this cannot be done. They therefore inoculate the whale with the poison of an infectious disease, and only after he is weakened as the result of the disease do they try to kill him. After the whale has been enclosed, the bowmen put out, and, when he comes to the surface to breathe, they shoot infected arrows into him and withdraw. After twenty-four or thirty-six hours the whale becomes less lively in his movements, and comes to the surface often to breathe. Then the real battle begins, and, after driving ten or twelve harpoons into the whale, the fishermen are able to land him. An examination of the places where the arrows were shot into the whale shows, in the immediate vicinity of some of them, a hemorrhagic infiltration of the muscular tissue, resembling very much the disease of land-animals called "sympathetic anthrax." The internal organs are normal. Once only Dr. Neilson found a bacillus in the blood-vessels of the spleen. Around the poisoned wounds vast numbers of a bacillus are found closely resembling that of sympathetic anthrax. When the arrows are pulled out of the wounds, many of these bacilli cling to them, and thus render them effective as "death-arrows" when further used. And thus the catching of whales goes on year after year, and has gone on for five hundred years. Dr. Neilson inclines to the opinion that the infection is the same as that of sympathetic anthrax, and hopes that later investigations may clear up the point.

Cocoanut-Water as a Culture-Fluid.

Dr. George M. Sternberg, writing in the *Medical News* of Sept. 13, 1890, says that he has used the juice of the unripe cocoanut as a culture-fluid, and found it very satisfactory. The idea occurred to him during a visit to Cuba that this fluid might be a useful culture-medium for bacteria, and upon making the experiment it was found that various species grew in it most luxuriantly. As it is contained in a germ-proof receptacle, no sterilization of the fluid is required when it is transferred with proper precautions to sterilized test-tubes, or is drawn directly from the nut into the little flask, with a long and slender neck, which is used for fluid-cultures. In these it may be preserved indefinitely, remaining perfectly transparent and ready for use. Heating the fluid causes a slight precipitate. In the investigations which have been made in Havana during the past two years, this fluid was used very extensively, and it was found a great convenience to have a sterile culture-fluid always at hand, ready for use at a moment's notice. Moreover, it has certain special advantages for the study of the physiological characters of various bacteria, and for the differentiation of species. It contains in solution about four per cent of glucose, in addition to vegetable albumen and salts, which alone would make it a useful nutrient medium. Certain micro-organisms multiply in it without appropriating the glucose, while others split this up, producing an abundant evolution of carbonic acid, and giving to the fluid a very acid re-action. As obtained from the nut, it has a slightly acid re-action, which makes it unsuitable as a culture-medium for certain pathogenic bacteria, but when desired it is a simple matter to neutralize it. For a large number of species of bacteria, and for the saccharomyces, it constitutes a very favorable medium.

Micro-Organisms in Great Cities.

Professor Tarnier, in a course of lectures in 1890, referred to M. Miquel's researches on the relative abundance of micro-organ-

isms in different places (*The British Medical Journal*). One to the cubic metre of air is the proportion at the top of a high mountain. It is stated in the *Medical Record* of Feb. 7 that in the Parc de Montsouris, in the south of Paris, M. Miquel found 400 micro-organisms to the cubic metre of air, while in the Rue de Rivoli the proportion was 3,480. In a new room in the Rue Censier he found 4,500 to the cubic metre; more, that is to say, than in the centre of Paris in the open air. In a room in the Rue Monge he counted 36,000, in the Hôtel Dieu 40,000, and in the Pitié, an older hospital, 319,000, micro-organisms to the cubic metre. At the Observatory, Montsouris, 650,000 microbes were found in a gram (15 grains) of dust; in the room in the Rue Monge the amount was 2,100,000. In the hospitals the proportion was so high, that counting the number of microbes in a whole gram of dust was found to be impossible. The dust is the great conveyer of micro-organisms. At 2 A.M., when a city is most quiet, the fewest germs are to be found in the air; at 8 A.M. the industry of domestic servants and dustmen has already made the air teem with germs; at 2 P.M. the proportion has again greatly fallen; at 7 P.M. it is once more high, for many houses are being "tidied up;" besides sundry kitchen operations are unhygienic. Thus the "small hours," unfavorable in many respects to patients hovering between life and death, are the least septic of the twenty-four. The day proportions indicate that household duties cause more septic diffusion than is excited by traffic and industry.

The Milk of the Egyptian Buffalo.

According to the researches of Messrs. Rappel and Richmond, of the Khedival Laboratory, Cairo, the milk of the Egyptian buffalo, or gamoose (*Bos bubalus*), presents several characteristics distinguishing it from that of the cow, which may well be remembered by medical men who have to treat patients, especially infants, in Egypt or in other countries where this animal is common. The amount of fat, as we learn from the *Lancet* of Aug. 23, 1890, was found to be a good deal larger than in cow's milk, the percentage in the specimens examined varying from 5.15 to 7.35. The sugar, which appeared to be a hitherto undescribed variety, differing from milk-sugar, was also found to be of larger amount than that in cow's milk, the average percentage being 5.41. It is suggested that this sugar should be called *teufkose*. The fat, too, was found to differ from that of cow's milk, containing minute quantities of sulphur and phosphorus, and yielding four times as much caproic acid as butyric acid, whereas in cow's milk the quantity of caproic acid is only double that of butyric acid. The milk was also found to contain a small quantity of citric acid.

The Chemistry of the Tubercle Bacillus.

At the clinic of Professor Nothnagel a very interesting investigation on the chemical composition of the tubercle bacillus, says the *Lancet*, has been carried out by Dr. Hammerschlag, who had commenced his studies on the bacillus at Professor Nencki's chemical laboratory at Berne. Two analyses of two different culture series were made. The cultures were 0.2 to 3 months old, and 7.5 and 2.2 grams moist bacteria were obtained for the analyses. They contained between 88.7 and 83.1 per cent water, between 28.2 and 26.2 per cent substances soluble in alcohol and ether; i.e., lecithin, fats, and a poisonous substance which, injected subcutaneously into guinea-pigs, produced clonic spasms of the muscles, acceleration of pulse and respiration, and finally general convulsions and the death of the animal from twelve to fifty-one hours after the injection. The residue which remained after the extraction with ether and alcohol contained an albuminoid body and cellulose: therefore the tubercle bacilli seem to differ from other bacteria by the high percentage of substances soluble in alcohol and ether, as they contain between 26 and 28 per cent, while bacterium termo contains only 7.3, Friedländer's diplococcus only 1.7, and the bacillus anthracis only 7.8 per cent. It has been found that the presence of carbohydrates and glycine is necessary for the growth of the bacilli, and that albumens alone are not sufficient as nourishing media for the tubercle bacillus, which differs thereby from the other bacteria. By experiments on rabbits, it was proved that a poisonous albuminoid body

is formed in the cultures by the bacilli, which (the dose used varied between 0.2 and 0.4 of a gram) produced, a few hours after the injection, a rise of temperature amounting to 1° or 2° C., lasting for one or two days, without any other effect even after repeated injections. The glycerine bouillon cultures lost their virulence on being kept for eight months at a temperature of 39° C., but they retained their vital activity. In experiments made on animals with such cultures of eight months' standing, only negative results were observed with regard to the production of immunity in animals by such cultures; and Hammerschlag, Falk, and Charrin have failed to produce a protective inoculation.

Physical and Chemical Changes in the Blood in Disease.

Dr. Sciolla of Genoa, at the Congress of the Italian Society of Internal Medicine, reported some interesting experimental researches on physico-chemical changes of the blood in different morbid conditions. He stated, according to the *Lancet*, that the density of the blood diminishes during acute febrile states and the first stages of convalescence, increasing afterward with greater or less rapidity according to the nature of the disease. The same thing is always observable in the density of blood-serum, with this difference, that it begins to increase as soon as there is any improvement in the condition of the patient; sometimes, indeed, a short time previously. The density of the serum is increased in malaria, while that of the blood is diminished. Tuberculous affections, unaccompanied by serious alterations of the blood, only slightly modify the density of blood-serum and blood. The densities of blood-serum and blood are both diminished in catarrhal jaundice, probably owing to defective assimilation of food. The density of the blood is almost normal, while that of the serum is increased, in cirrhosis of the liver and in cancer of the gall-bladder. The densities of blood and serum are not sensibly diminished in benign forms of diabetes. The greatest diminution in the density of the blood is observable in diseases accompanied by grave morbid changes of the blood. The most striking examples were those seen in three fatal cases of pneumonia. Dr. Sciolla also observed the chemical modifications of the blood in pneumonia, typhoid-fever, malaria, anæmia, and in leucæmia. About the fourth or fifth day of croupous pneumonia there is a marked diminution in the albuminoid substances of the blood, especially the globulin. The extractive matters increase during the febrile period. In convalescence the quantity of albuminoids, especially of the globulin, and also that of the serin, increased. The dry residue of the blood is not much diminished during the first stage of the disease, but it so during the second stage, and continues less until convalescence. In typhoid-fever the albumens of the blood diminish progressively (unless the diarrhoea is excessive), and this diminution occurs at the expense of the serin. The extractive matters gradually diminish during the whole of the febrile period, and even during the early stage of convalescence. In malarial fevers the amount of the albuminoids in the blood-serum (especially the serin, and in a less degree the globulin) and the dry residue of the blood diminish rapidly, while the dry residue of the serum and the extractive matters of the serum increase with the duration of the fever,—the former in a slight degree, the latter enormously. In chloro-anæmia the albumens of the serum (especially the globulin) and the dry residue of the blood diminish, while the dry residue of the serum increases. In leucæmia the amount of dry residue of the serum is very high, and the albuminoids of the serum are also above the normal, the serin being especially increased.

NOTES AND NEWS.

THE expedition which is to be sent in the spring to the west coast of Greenland, by the committee of the Karl Ritter Endowment, is likely to be one of considerable importance. The chief of the expedition, as we learn from *Nature* of Feb. 5, will be Dr. E. von Drygalski; Dr. O. Baschin will accompany it, defraying his own charges; and there will be a third scientific expert, who has not yet been selected. Dr. von Drygalski proposes to establish a station near the Umanackfjord, in about $70^{\circ} 30'$ north latitude, where Dr. Baschin will carry out a continuous series of meteorological observations, and from which he can make long or short excursions inland to study the interior ice. It is expected that the party will remain in Greenland about a year.

—Two Frenchmen, Dr. Besson and Père Tulazac, have succeeded in making the first ascent to the summit of Ambondrombo, dreaded by the Betsileos as sacred, or *tabu*. They, however, found five Betsileos willing to accompany them to the top. According to the January "Proceedings of the Royal Geographical Society," the party started from Amboasary, the nearest village to the mountain, and reached the summit in seven hours. Axes and knives had frequently to be used to clear the way. The mountain is rugged and wooded, reaching a height of 6,234 feet. The party had to cross many ravines during the ascent.

—From Dorsetshire, England, a singular instance of starlings being eaten by rooks is reported (*Nature*, Feb. 5). It seems that during the very severe weather there this winter, a flock of starlings was observed on a farm at West Stafford, near Dorchester, followed by a number of rooks in hot pursuit. The larger birds soon came up with their prey, and quickly despatched them, and, after stripping them of their feathers, devoured them then and there. When the scene of the occurrence was inspected just afterwards, the ground was found to be strewn with their feathers, but beyond these not a vestige of the starlings could be discovered. It seems that the rooks, from sheer hunger, must have been driven to this extremity, owing to the scarcity of other kinds of food.

—A method of repairing incandescent lamps, the invention of a M. Pauthonier, is described in a recent number of *L'Electricien*. The lamp to be repaired is first taken to a glass-blower, as quoted in *Engineering* of Feb. 6, who pierces a hole in the bulb sufficiently large to allow of the old filament being taken out and a new one inserted. From the hands of this workman the lamp passes to a second, who cuts off the ends of the broken filament and removes it, taking care, however, at the same time to leave about one millimetre of the filament at each of the platinum electrodes; and it is to these short lengths of the old filament that the new one is welded. This is done by filling the bulb with a liquid hydrocarbon, after which the new filament, which has been previously standardized, is introduced. One end of the filament is then pressed against the fragment of the old one already referred to, and a current passed through the joint. The hydrocarbon is decomposed, and a deposit of solid carbon occurs round the joint, and securely fastens the new filament in place. The other end of the filament is joined to the other electrode in the same way. The next process is the bleaching of the glass, which is so thoroughly done that the glass of the repaired lamps is said to be more brilliant and transparent than that of perfectly new ones. The repaired lamps are said to last quite as long as new ones, to which they are in no respect inferior. The process is said to be peculiarly adapted to the repair of lamps of the "Sun-beam" type.

—To stimulate the collection of photographs to be used in showing the need of improved roads in the United States, the Connecticut division joins the New York division of the League of American Wheelmen in offering three prizes aggregating \$100, as follows: one prize of \$50 for the best collection of not less than three photographs, one prize of \$30 for the second best collection of not less than three photographs, one prize of \$20 for the third best collection of not less than three photographs. There are wanted photographs showing the common spectacle of the farmer's team and wagon, hub-deep and knee-deep in the muddy road; photographs showing rough, rutty, and muddy roads in their worst condition; photographs showing the everyday break-down caused by rough or muddy roads or steep grades; photographs showing smooth, hard-surfaced roads and (if possible) teams hauling loads over the same; and other pictures illustrating the goodness of good roads and the badness of bad roads. The prizes will be awarded before May 15, 1891. Further information will be furnished on application to either Isaac B. Potter, 278 Potter Building, New York, N.Y., or Charles L. Burdett, Hartford, Conn.

— According to the latest observations which Dr. Finsterwalder has published, as stated in *The Scottish Geographical Magazine* for February, the region occupied by advancing glaciers is extending from west to east, and has lately crossed the limits of the eastern Alps. The glaciers in this region have been receding during the last thirty years, but now there is undeniable proof that those of the Ortler group, at any rate, are in a state of progression.

— Assistant E. D. Preston of the United States Coast and Geodetic Survey will soon go to the Hawaiian Islands for the purpose of making a series of latitude observations, to be used in connection with others to be made by several of the countries who are connected with the International Geodetic Association. The question of a change in the position of the earth's axis has led to some special refinements in the method of observing astronomical latitudes. Whatever may be the cause of the supposed motion of the pole, whether it results from the shifting of volumes of the atmosphere or water above the surface, or the movement of liquid or semi-liquid masses within the earth's crust, the quantity to be measured is so small that it is necessary to reduce the uncertainty of the determination to a very few feet. The observations at Honolulu soon to be taken up simultaneously by the United States Coast and Geodetic Survey and the International Geodetic Association of Europe will decide whether the variation is a purely local one or whether there is a real change in the position of the axis of rotation. Observations made last year in Europe, and also in this country by Professor Comstock at Madison, Wis., seem to indicate that there is an interference between the motions of the axis of rotation and the axis of inertia, producing a maximum every year in the mean motion, and a larger maximum at the end of five years. In Europe the minimum of 1890 was 0.20" smaller than the minimum of 1889. Besides, the Greenwich observations of latitude for the last sixty years show there is a long period of inequality of at least this length. In order to bring out these small changes, the following precautions will be taken in the execution of the work: no zenith distances greater than 30° will be used, and differences of zenith distances shall not be more than 12'; stars will be chosen so that any error in the value of the micrometer-screw will be eliminated, and the preference will be given to stars whose proper motions are well known; the barometer and thermometer will be read in order to note atmospheric changes. The Coast and Geodetic Survey representative, Mr. Preston, will also avail himself of the opportunity to make magnetic and gravity observations at a number of points on the islands, including one station on the summit of Mauna Kea at an elevation of 14,000 feet. Some meteorological observations will probably be made as well. The following instruments will be taken: a zenith telescope for the regular international latitude work, a meridian telescope (or combination instrument) for time and latitude observations at the pendulum stations, and a theodolite-magnetometer and dip circle for magnetic observations. The pendulums for the gravity observations will be of a new pattern, very portable, and will be observed by means of an elegant method of coincidences devised by Professor Mendenhall.

— The monthly report for January of Arthur Winslow, State geologist of Missouri, states that only such field-work has been done as was necessary to complete those divisions of work which were included among the operations of the past season. Thus, in Jackson County some little field-work was done to complete the examination of the clay and building-stone industries of the western counties; and in Randolph, Howard, and Lafayette Counties instrumental levelling was done in order to determine the altitudes of various coal-beds. But the bulk of the work during the past month has been in the office, where the members of the survey are engaged in plotting the results of surveys made during the past summer and autumn. In addition, they have been busy correcting the proof of Bulletin No. 3, and in preparing the manuscript of the biennial report and of Bulletin No. 4 for the printer. Bulletins Nos. 2 and 3 have been printed, and about a thousand copies of each have been distributed. Bulletin No. 2 is a bibliography of the geology of Missouri, the manuscript of which was

prepared and donated to the survey by Mr. F. A. Sampson of Sedalia. It is a valuable work of reference, and will be of great use to all who are interested in the geology of Missouri and her minerals. Bulletin No. 3 contains papers on the clay, stone, lime, and sand industries of St. Louis City and County, and on the mineral waters of Johnson, St. Clair, Henry, and Benton Counties. These papers contain a mass of facts concerning the subjects to which they relate, in addition to statistics of production. They are, however, provisional publications; and the results of analyses and tests now in progress, together with other matter not yet ready for presentation, are reserved for the final report on these special subjects, which it is hoped will be prepared this year. In the laboratory, analyses of clays and mineral waters have been prosecuted, and 136 determinations have been made. In addition, a number of substances sent in by various citizens of the State have been determined and reported upon.

— The third annual meeting of the Association of American Anatomists was held Dec. 29 and 30, 1890, in the anatomical lecture-room of the Harvard Medical School, Boston, Mass. It was presided over by Dr. F. D. Weisse, second vice-president, and Dr. Thomas Dwight acted as secretary *pro tem*. Papers were read as follows: "Corrosion Preparations," by Dr. S. J. Mixter; "Studies on the Spine," by Dr. Dwight; "A Comparison of the Fibrine Filaments of Blood-Lymph in Mammalia and Amphibia," by Professor S. H. Gage; "The Semi-Lunar Bone," by Professor Shepherd; "The Structure of Protoplasm and Mitosis," by Dr. Carl Heitzmann; "The homology of the Cerebrospinal Arachnoid with the Other Serous Membranes," by Professor F. W. Langdon; "The Occlusion of the Rhinocæle (Olfactory Ventricle) in the Dog," by Mr. P. A. Fish; and three papers—"The Relations of the Olfactory to the Cerebral Portion of the Brain," "The Brains of a Cat and of a Sheep lacking the Callosum," "Owen's Nomenclature of the Brain, with Suggestions based Thereon"—by Professor B. G. Wilder. With one exception, the papers were illustrated by specimens, photographs, or diagrams, and all were fully discussed. The committee on anatomical nomenclature (Professors Leidy, Harrison Allen, Frank Baker, Thomas Dwight, T. B. Stowell, and B. G. Wilder) were authorized to publish as their second report "such general and specific recommendations as may be unanimously agreed upon by them." The following were elected members: Dr. W. W. Dana of Portland, Me.; Dr. John C. Munro of Boston, Mass.; Mr. Pierre A. Fish of Ithaca, N.Y. The next meeting will be held at Washington, D.C., in September, 1891, at or about the time of meeting of the Congress of American Physicians and Surgeons. The officers for that meeting are as follows: president, Joseph Leidy; vice-presidents, Frank Baker, F. D. Weisse; secretary and treasurer, D. S. Lamb; executive committee, Harrison Allen, Thomas Dwight, and B. G. Wilder.

— It is reported, says *The Engineering and Mining Journal*, that an organization is in progress of formation at Youngstown, O., which will be one of the strongest in iron circles in the United States, representing an investment of \$7,735,000. The body will be known as the Mahoning & Shenango Valley Iron Manufacturers' Association, and includes the iron manufacturers of both valleys. These concerns include twenty-two furnace stacks, thirteen rolling-mills, one pipe-works, and one wash-metal plant. The output of pig iron is 1,200 tons annually and 450,000 tons of finished iron, while the number of men employed will exceed 2,000. It is the first time in the history of the iron business in eastern Ohio and western Pennsylvania that the iron manufacturers have been united.

— M. H. Coudreau has completed the first part of the mission of exploration in the basin of the river Oyapock, Guiana, with which he was intrusted by the French Government. The traveler, when among the mountains of Emerillons, between the Inipi and the Apronague, was abandoned by his guides. This misfortune, which occurred in January, 1890, caused the loss of much valuable time, so that the work of exploration had to be undertaken during the rainy season. The results of this winter campaign are as follows ("Proceedings of the Royal Geographical Society," Jan.): The seven chief affluents of the Oyapock, which

drain the whole of the south east of the country, were surveyed on the scale 1:100,000: five out of the seven were ascended by the traveller up to their sources. His surveys include about 430 miles of quite unexplored country, besides 235 miles of new work on the Oyapock. Two of these tributaries carried him right into the heart of the Tumuc Humac Range, where he was able to study the native languages. He has collected twenty-five hundred words of the Oyampi language. The whole of the south-east region abounds in marshes, and presents a desolate picture. On all sides are the ruins of Indian villages. Small-pox and dysentery, and a steady emigration to the south-west of the country, are rapidly thinning the population; so that a generation hence, M. Coudreau says, the south east will be practically uninhabited. The Creoles may, however, be attracted to this region on account of its auriferous character, but it will not be easily exploited owing to the numerous falls in the rivers. In July last the travellers was about to start upon the second portion of his work. He intended to navigate the Oyapock to its source, cross the Tumuc Humac Mountains to the southern side, and visit the Indians living near the sources of the Tapanahony by a new route. Thence he will reach the Itany, descend the Aoua, and return across the whole central part of French Guiana. This central journey will occupy eight months.

— A course of five lectures on the ethnology of modern Europe, by Dr. D. G. Brinton, was begun Monday afternoon, Feb. 16, at the Academy of Natural Sciences of Philadelphia. The subjects of the different lectures are as follows: 1. "The Predecessors of Modern European Nations;" 2. "The Romance and Hellenic Nations (France, Spain, Portugal, Italy, Greece, etc.);" 3. "The Teutonic Nations (Germans, Danes, Swedes, English, etc.,—Celtic Remnants);" 4. "The Slavonic Nations (Russians, Poles, etc.);" 5. "The Allophylic Peoples (Basques, Finns, Hungarians, Turks, etc.)." These lectures are free, and tickets may be obtained of the secretary of the academy, Dr. E. J. Nolan.

— In a communication to the French Physical Society, M. Cailliet has described a method of connecting a metal tube or stop-cock to a vessel of glass or porcelain so that the joint shall be tight even under high pressures. As described in *Engineering*, the process is simple, and consists in first coating the glass or porcelain vessel with a very thin layer of platinum at the part where the connection is to be made. This may be done by painting the glass, after slightly warming it, with a neutralized solution of platinic chloride mixed with the essential oil of camomile. The layer of oil and platinic chloride is then slowly heated till the last traces of oil have been expelled, and the temperature is then raised to a dark-red heat. The chloride is thus reduced, and the platinum deposited as a bright metallic mirror on the surface of the glass. On this layer of platinum a second layer of copper is deposited by electrolysis, and the metal stop-cock or tube can then be soldered by means of tin to this copper ring. M. Cailliet states that he has found these joints to remain tight under a pressure of 300 atmospheres.

— A theory attempting to explain the nature of the relationship between the optical activity of many substances in solution, and the hemihedrism of their crystalline forms, is advanced by Dr. Fock, the author of the new work on chemical crystallography, in *Berichte*, and quoted in *Nature* of Feb. 5. It is certainly a most significant fact that all those substances whose solutions are capable of rotating the plane of polarization of light, and whose crystalline forms have been thoroughly investigated, are found to form hemihedral crystals; that is to say, crystals some of whose faces have been suppressed, and whose two ends are therefore differently developed. Moreover, in those cases where both the right rotatory and left rotatory varieties of the same chemical compound have been isolated and examined, as in the case of dextro- and lævo-tartaric acid, the hemihedral crystals are found to be complementary to each other, the faces undeveloped upon the one being present upon the other, so that the one is generally as the mirror-image of the other. Several ingenious attempts to account for the wonderful geometrical arrangement of the molecules in a crystal have been made of recent years by Bravais, Mallard, and others, who developed the "Raumgitter" theory,

and by Sohncke, who showed that all possible crystallographical forms could be referred to systems of points; yet it has been found necessary by these crystallographers to assume a polarity of the molecule itself in order to fully explain the phenomenon of hemihedrism. This conclusion is, moreover, borne out by the more recent work of Lehmann upon his so-called "liquid crystals." It is, indeed, evident that hemihedral crystals owe their hemihedrism to a differentiation of the various parts of the molecules themselves in space. Dr. Fock assumes, for the purpose of connecting this fact with the optical rotation of the dissolved crystals, the tetrahedral form for the element carbon, in the most recent conventional sense employed by Wislicenus, Van't Hoff, Victor Meyer, and other exponents of the new "stereo-chemistry." The axis of polarity of a molecule containing an asymmetric carbon atom, will, of course, be determined by its centre of gravity and the heaviest "corner" of the tetrahedron; and Dr. Fock shows that rotation of the molecule will be most easy round this axis, and in the direction, right or left, determined by the relative weights of the atoms or groups disposed at the other three "corners." He further shows, that, if we consider any direction of vision through the solution, we must practically consider two positions of the molecules, in both of which the axis of rotation is parallel with our line of sight, and in one of which the apex of the tetrahedron is turned towards us, and in the other is directed away from us and the other three corners presented to us. As the molecules are, of course, in rapid motion, we must consider all other positions as balancing each other, and being resolved eventually into these two directions. It is then easy to see, as it is now accepted from Fizeau's work that the movement of molecules is capable of influencing the direction of light-waves, that there must be two oppositely moving circularly polarized rays produced. Now, it is generally supposed that the rotation of liquids is really due to the division of the light into two circularly and oppositely polarized rays, one of which, however, is stronger than the other, and determines the apparent optical activity. Dr. Fock completes his theory by showing the probability that there would be just this difference in the amount of rotation of the light in the two cases of the differently disposed molecules, those with their "apices" turned towards the direction of incidence of the light affecting it to a different extent from those whose "bases" were the first to receive it. The theory is well worth following out in the original memoir, many confirmations of it being adduced from other properties of hemihedral crystals.

— Señor Felipe Poey, the renowned Cuban philosopher and naturalist, is dead. He was born in Havana, May 26, 1799, and studied law in Madrid, where he was implicated in a political conspiracy, and from whence he fled to Paris. There he published in 1828 "*La Centurie des Lépidoptères*," and helped to found the French Entomological Society. He returned to Havana after the revolution of 1830, was commissioned in 1837 to organize a museum of natural history, and became one of its directors. Soon afterwards he was appointed professor of natural history in the University of Havana. In 1840 he published a school geography of the Island of Cuba, and in 1842 a more extensive work on the same subject, and a "*Geografía Universal*." In 1864 he published "*Memorias Sobre la Historia Natural de la Isla de Cuba*," with Spanish, French, and Latin text. In 1865 he started a monthly periodical entitled *Repertorio Físico-Natural de la Isla de Cuba*, in which he described upward of two hundred and thirty new species of fishes, as well as the *ciguatera*, or jaundice, caused by eating certain Cuban fishes. He also published some remarkable poems. He was a member of the Smithsonian Institution, and a corresponding member of the French Academy of Sciences.

— Some time ago M. Berthelot, judging from a text of the eleventh century, formed the opinion that the word "bronze" was derived from "Brundusium," or Brindisi. We learn from *Nature* of Jan. 29 that this view has been confirmed by the discovery of a passage in a document of the time of Charlemagne, where reference is made to the "composition of Brundusium;" copper, two parts; lead, one part; tin, one part. It would appear that at Brundusium bronze was in ancient times manufactured on a great scale.

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Attention is called to the "Wants" column. All are invited to use it in soliciting information or seeking new positions. The name and address of applicants should be given in full, so that answers will go direct to them. The "Exchange" column is likewise open.

THE SOUTH AFRICAN DOCTRINE OF SOULS.¹

IN the second of two interesting papers on the manners, customs, superstitions, and religions of South African tribes (*Journal of the Anthropological Institute*, vol. xix. No. 3, and vol. xx. No. 2), the Rev. James Macdonald, who has had ample opportunities of studying the subject, has a good deal to say about the doctrine of souls which prevails among the aborigines of South Africa. It is extremely difficult, he explains, to discover what the people really believe about the spirit-world, so many and varied are the traditions relating to it. There are, however, certain outstanding facts common to all; and of these Mr. Macdonald gives a clear and instructive account.

All human beings are supposed to have souls, but their souls are not believed to be entirely confined to the body. A man's soul may, it is thought, occupy the roof of his hut; and, if he changes his residence, his soul does so at the same time. Mr. Macdonald takes this to be a loose and indefinite way of expressing "the belief that a man's spirit may have influence at a distance from the place where he is himself at any time." The people often use the word "zitunzela," from "izitunzi" ("shadows"), to express their ideas of human spirits and the unseen world generally; and this is "the nearest description that can be obtained." A man is constantly attended by the shadows or spirits of his ancestors as well as his own, but the spirit of one who dies without speaking to his children shortly before death never visits his descendants except for purposes of evil. In such cases magicians or priests offer costly sacrifices to prevent misfortune and death.

Great importance is attached to dreams or visions, which are supposed to be due to spirit influence. When the same dream comes more than once, the dreamer consults the magicians, who profess to receive revelations through dreams. If the dreamer has seen "a departed relative," the magician says, "He is hungry." Then a beast is killed; the blood is collected, and placed in a vessel at the side of the hut farthest from the door; the liver is hung up in the hut, and must not be eaten until all the flesh of the animal has been used. The "essence" of the food is "withdrawn" by the spirit during the night, and after a specified time all may be eaten except the portions which the magician orders to be burned.

Ancestor-worship is not only professed by the South African tribes, but "they actually regulate their conduct by it." Says Mr. Macdonald,—

"If a man has a narrow escape from accident and death, he says, 'My father's soul saved me,' and he offers a sacrifice of

¹ From Nature.

thanksgiving accordingly. In cases of sickness, propitiatory sacrifices are offered to remove the displeasure of the ancestors, and secure a return of their favor. Should any one neglect a national custom in the conduct of his affairs, he must offer sacrifice to avert calamity as the consequence of his neglect. When offering propitiatory sacrifices, the form of prayer used by the priest is, 'Ye who are above, accept our offering and remove our trouble.' In freewill offerings, as in escape from danger, or at the ripening of crops, the prayer takes the following form: 'Ye who are above, accept the food we have provided for you, smell our offering now burning, and grant us prosperity and peace.'"

Animals are not supposed to have souls, neither are inanimate objects; but spirits may reside in inanimate objects, and their presence has an influence on many customs and habits. A striking example of such influence was afforded during the rebellion of 1879, when Umhlonhlo, after the murder of the British Resident, was one day marching in a leisurely manner across country with his whole army. The forenoon was hot, and not a cloud was to be seen. Presently the magicians noticed on the horizon a peculiarly shaped cloud. "It rose rapidly in one mass, and a rolled upon itself." Its movements were intently watched till it approached the zenith and passed over the sun. This was an evil omen. For some unknown cause the spirits were mortally offended, and had come over the army in shadow at noonday. In grief and sorrow their backs were turned upon their children, and the result of this would be certain defeat and disaster. There was, however, no immediate danger. That morning's scouts had reported that there were no troops within many miles of their line of march, and they could repair to some sacred place to offer sacrifices and make atonement. While they were discussing which place to repair to for this purpose, the van of a small column of cavalry appeared unexpectedly over a rising ground. Dismay struck into every heart. The war minister urged his men to form into order of battle. No one answered his summons. He did his best to organize an orderly retreat, but in vain. Not a blow was struck, and every man took to his heels, making for the nearest hiding-place in mountain or forest. That army never re-assembled. Black-hearted fear utterly demoralized it."

Water or river spirits play a great part in South African mythology. They inhabit deep pools where there are strong eddies and under-currents. They are dwarfs, and are of a malignant disposition, which they display by greedily seizing on any one who comes within their reach. They are, of course, greatly feared; and the popular dread of them is shown in a way which has been known in many different parts of the world. Mr. Macdonald gives the following example:—

"Some years ago a number of Gcaleka girls were, on a fine summer day, bathing in the Bashee. One of them got beyond her depth, and began to struggle in the water, and cry for help. Her companions promptly raised the alarm, and two men working close by ran down to the water's edge. She was still struggling feebly, but to the onlookers it was a clear case of being 'called' by the river, and they made no attempt to save her. The body was recovered by the magicians the same day, when it was found she had been drowned in less than five feet of water. All this came to the ears of C. G. H. Bell, Esq., the English Resident; and he cited the parties, magicians and all, to appear before him in court. The two men not only admitted that they could have waded to the spot where they saw her struggling, but also said the water would not be 'more than breast deep.' They had made no effort to save her, as it would be 'improper and dangerous to interfere when one is called by the river.' Mr. Bell tried to argue them out of such absurd notions, but to little purpose, and finally came to the conclusion that 'six months hard' might be more effectual in eradicating superstition than all his philosophy, and six months hard it accordingly was."

Mr. Macdonald says there is no periodical process of purging or driving away spirits. Without the presence and aid of magicians, ordinary people dare not interfere with these mysterious powers, however malignant and destructive they may become. Although a man is guarded by the spirits of his ancestors, they do not protect him from demons or from wizards and witches. A certain

measure of protection can, however, it is supposed, be obtained by the use of charms provided by magicians. On one occasion, when war was being carried on with England, the magicians gave the soldiers a charm against English bullets. It was the blue flower of a species of rhododendron. "Those who carried this talisman rushed forward against columns of infantry without a shadow of fear or hesitation; and only when men began to bite the dust in all directions did the nature of the delusion break upon the army, and panic ensue."

DEAF-MUTE INSTRUCTION.¹

THE Sundry Civil Bill grants \$52,500 to the Columbia Institution for the Deaf and Dumb, an increase of \$5,000 over former appropriations.

President Gallaudet says, "The object of this increase is to enable the directors to enlarge the facilities afforded in the institution for normal instruction. For many years the graduates of our collegiate department have been in demand as teachers of the deaf in the primary schools of the several States. The demand for such teachers has far outgrown our limited supply; and as no normal school for the training of teachers of the deaf exists in this country, while several are sustained in Europe, it has been thought extremely desirable that the advantages for normal instruction existing in this institution to a limited degree should be increased."

In accordance with your suggestion, I submit herewith a brief statement of my reasons for opposing this grant, and trust you will allow me a hearing before your committee:—

1. The proposed normal department is a new departure, which will probably lead to largely increased appropriations in the future, diverting public money to an object foreign to the purposes for which the institution was established.

2. Such a training-school for teachers, supported by the National Government, will interfere with that healthy competition which now exists between rival methods of instructing the deaf.

3. In the Columbia Institution a foreign language (the sign-language) is used as the medium of instruction, whereas the rival methods employ the English language alone for this purpose.

4. The graduates of the collegiate department are, of course, deaf. The institution, therefore, proposes to train deaf persons to teach the deaf. This is a backward step, detrimental to the best interests of the deaf, and subversive of the very object for which the collegiate department exists.

5. Great efforts are now made to teach deaf children to speak; and articulation teachers are employed in all important schools for the deaf, with the exception of the collegiate department of the Columbia Institution.

6. The president of the Columbia Institution has stated that lack of funds alone prevents the employment of special articulation teachers in the National College. The increased appropriation of \$5,000 now asked for would, if applied to this purpose, not only enable the collegiate department to employ ordinary teachers of articulation, but also a professor of elocution, who could carry up articulation work to the highest point of perfection attainable by the deaf.

7. I would gladly support an application for \$5,000, to be expended for the employment of articulation teachers and a professor of elocution in the collegiate department of the institution, but I would strongly oppose an application for the purposes set forth by President Gallaudet.

REPORT OF PROGRESS IN SPECTRUM WORK.²

DURING the past year or two a great deal of work has been done in the photography of the spectra of elements and the identification of the lines in the solar spectrum, which it will take a long time to work up, ready for publication: hence I have thought that a short account of what has been done up to the present time might be of interest to workers in the subject. In the prosecu-

tion of the work, financial assistance has been received from the Rumford Fund of the American Academy of Arts and Sciences, as well as from the fund given by Miss Bruce to the Harvard Astronomical Observatory for the promotion of research in astronomical physics, and the advanced state of the work is due to such assistance.

The work may be summed up under the following heads:—

1. The spectra of all known elements, with the exception of a few gaseous ones, or those too rare to be yet obtained, have been photographed in connection with the solar spectrum, from the extreme ultra-violet down to the D line, and eye-observations have been made on many to the limit of the solar spectrum.

2. A measuring-engine has been constructed with a screw to fit the above photographs, which, being taken with the concave grating, are all normal spectra and to the same scale. This engine measures wave-lengths direct, so that no multiplication is necessary, but only a slight correction to get figures correct to $\frac{1}{100}$ of a division of Angstrom.

3. A table of standard wave-lengths of the impurities in the carbons, extending to wave-length 2000, has been constructed to measure wave-lengths beyond the limits of the solar spectrum.

4. Maps of the spectra of some of the elements have been drawn on a large scale, ready for publication.

5. The greater part of the lines in the map of the solar spectrum have been identified, and the substance producing them noted.

6. The following rough arrangement of the solar elements has been constructed entirely according to my own observations, although, of course, most of them have been given by others: according to intensity, calcium, iron, hydrogen, sodium, nickel, magnesium, cobalt, silicon, aluminum, titanium, chromium, manganese, strontium, vanadium, barium, carbon, scandium, yttrium, zirconium, molybdenum, lanthanum, niobium, palladium, neodymium, copper, zinc, cadmium, cerium, glucinum, germanium, rhodium, silver, tin, lead, erbium, potassium; according to number, iron (2000 or more), nickel, titanium, manganese, chromium, cobalt, carbon (200 or more), vanadium, zirconium, cerium, calcium (75 or more), scandium, neodymium, lanthanum, yttrium, niobium, molybdenum, palladium, magnesium (20 or more), sodium (11), silicon, strontium, barium, aluminum (4), cadmium, rhodium, erbium, zinc, copper (3), silver (2), glucinum (2), germanium, tin, lead (1), potassium (1); doubtful elements, iridium, osmium, platinum, ruthenium, tantalum, thorium, tungsten, uranium; not in the solar spectrum, antimony, arsenic, bismuth, boron, nitrogen (vacuum tube), caesium, gold, indium, mercury, phosphorus, rubidium, selenium, sulphur, thallium, praseodymium; substances not yet tried, bromine, chlorine, iodine, fluorine, oxygen, tellurium, gallium, holmium, thulium, terbium, etc.

These lists are to be accepted as preliminary only, especially the order in the first portion. However, being made with such a powerful instrument and with such care in the determination of impurities, they must still have a weight superior to most others published.

I do not know which are the new ones, but call attention to silicon, vanadium, scandium, yttrium, zirconium; glucinum, germanium, and erbium, as being possibly new.

Silicon has lines on my map at wave-lengths 3905.7, 4103.1, 5708.7, 5772.3, and 5948.7. That at 3905.7 is the largest and most certain. That at 4103.1 is also claimed by manganese.

The substances under "not in the solar spectrum" are often placed there because the elements have few strong lines or none at all in the limit of the solar spectrum when the arc spectrum, which I have used, is employed. Thus boron has only two strong lines at 2497. Again, the lines of bismuth are all compound, and so too diffuse to appear in the solar spectrum. Indeed, some good reason generally appears for their absence from the solar spectrum. Of course, this is little evidence of their absence from the sun itself.

Indeed, were the whole earth heated to the temperature of the sun, its spectrum would probably resemble that of the sun very closely.

With the high dispersion here used, the "basic lines" of Lockyer are widely broken up, and cease to exist. Indeed, it would

¹ Open letter of Alexander Graham Bell to Hon. William B. Allison, chairman of the Senate Committee on Appropriations, dated at Washington, D.C., Feb. 11, 1891.

² From Johns Hopkins University Circulars.

be difficult to prove any thing except accidental coincidences among the lines of the different elements. Accurate investigation generally reveals some slight difference of wave-length or a common impurity.

Furthermore, the strength of the lines in the solar spectrum is generally very nearly the same as that in the electric arc, with only a few exceptions, as, for instance, calcium. The cases mentioned by Lockyer are generally those where he mistakes groups of lines for single lines, or even mistakes the character of the line entirely. Altogether there seems to be very little evidence of the breaking-up of the elements in the sun, as far as my experiments go.

Even after comparing the solar spectrum with all known elements, there are still many important lines not accounted for. Some of these I have accounted for by silicon, and there are probably many more. Of all known substances, this is the most difficult to bring out the lines in the visible spectrum, although it has a fine ultra-violet one. Possibly iron may account for many more, and all the elements at a higher temperature might develop more. Then, again, very rare elements, like scandium, vanadium, etc., when they have a strong spectrum, may cause strong solar lines, and thus we may look for new and even rare elements to account for very many more. Indeed, I find many lines accounted for by the rare elements in gadolinite, samarskite, and fergusonite other than yttrium, erbium, scandium, praseodymium, neodymium, lanthanum, and cerium, which I cannot identify yet, and which may be without a name. For this reason, and to discover rare elements, I intend finally to try unknown minerals, as my process gives me an easy method of detecting any new substance or analyzing minerals however many elements they may contain.

The research is much indebted to the faithful and careful work of Mr. L. E. Jewell, who has acted as my assistant for several years. Preliminary publications of results will be made in the *University Circulars*.

Among the latest results I may mention the spectroscopic separation of yttrium into three components, and the actual separation into two.

HENRY A. ROWLAND.

DUTCH BORNEO.¹

LITTLE is known of the interior of the Island of Borneo, and therefore the information supplied by Heer S. W. Tromp in the *Tijdschrift van het Kon. Nederlandsch Aardrijkskundig Genoot.*, Deel vii. No. 4, though incomplete, is very acceptable. In 1885 he steamed up the Mahakam River to Muvara-Pahu, a village about 190 miles from the sea. Near the coast the land is flat, and is being laid out in rice-fields. It would also, in Heer Tromp's opinion, be suitable for the cultivation of sugar-cane. Farther up the river, hilly country is entered, covered with a layer of yellowish-red soil, of little value for agriculture. After eight hours' steaming from Samarinda, Heer Tromp passed the mouth of the Sebulu River, and two hours and a half later reached Naga-Beulur. Here the hills, which extend from Pelarang (a short distance below Samarinda), suddenly terminate, and the river emerges through a narrow channel from a level tract, stretching northwards probably to the frontier of Berau, which was formerly the bed of a large lake. Even now this depression is not entirely filled up. Meres and morasses of large area lie on either side of the Mahakam, and when the water is high, that is, during the greater part of the year, a large proportion of the country is submerged. The district of the Upper Mahakam is inhabited by a tribe of Dyaks, known as Bahau-Dyaks in Kutei, and elsewhere as Pari-Dyaks. Their number is estimated at 4,500. Formerly they were notorious head-hunters, and were much dreaded in the Baritu valley, but of late greater security has been established by the interference of the Sultan of Kutei.

The development of the country, however, has not been accelerated thereby, for, with the festivals held on the bringing-home of heads, has also disappeared the stimulus to industry. Large sums were formerly expended in gala-dresses for the women, of silk adorned with beads; and tobacco and rice were provided in

abundance. Moreover, the Buginese dealers, as they have circulated more freely through the country, have introduced hazard and cock-fighting, with the most disastrous consequences. The steamer in which Heer Tromp travelled was unable to ascend the river beyond Muvara-Pahu, but he himself advanced some distance farther in a rowing-boat. As far as Juhalang the river is easily navigable; but beyond, the current is too strong, except when the water is abnormally low, and at Kapala-kiham a series of waterfalls practically limits the navigation.

Hence the difficulty of extending Dutch rule into Upper Kutei. Indeed, communication with Sarawak along the Seliku, one of the most important affluents of the Mahakam, which rises in the Batu-Tibang opposite the sources of one of the tributaries of the Batang-Rejang, seems to be more feasible than with the Lower Mahakam. It is also possible to reach the Upper Kayan by the Boh River, which enters the Mahakam above the first fall; but it necessitates a journey of eight days on the river, and three over uneven and stony country to the highest navigable point of the Laya, a tributary of the Kayan. In the last-mentioned river an obstruction is said to exist even more formidable than the falls on the Mahakam. This remote country is inhabited by a number of Dyak tribes, which, as well as the Bahau-Dyaks of the Mahakam, the Kenyas of the Upper Kayan, and others, had their home originally near the sources of Kayan. Since such insurmountable obstacles to communication exist on the routes already discussed, Heer Tromp turns his attention to the Kapuas River on the west. He passes over the lower course of the river up to Bunut with only a few cursory remarks, as it has been already described by Professor Veth in his *Borneo's Westerafdeeling*. The town of Bunut, at the mouth of a tributary of the same name, is the capital of the last Malayan kingdom.

Several affluents enter the main stream before the next town of any importance, Putus-Sibow, is reached. Here the Dyaks carry on a considerable trade with the Malay dealers, bartering the products of their forests against copper utensils, salt, tobacco, linen, crockery, etc. In 1888 Heer Tromp ascended this river, the Kapuas, in a steamer as far as the mouth of the Mendalam, a distance of 400 miles from the sea. It will be seen at once that it possesses a great advantage over the Mahakam, on which navigation is possible only for a distance of 250 miles.

Moreover, the Mendalam can be ascended by steamer, and Heer Tromp continued his journey in a boat up the Kapuas itself as far as Lunsä. Hajji Achmet, a native clerk, ascended the Bongan River, which enters the Kapuas at Lunsä, and its affluent the Bulet, to a point whence, he heard, the Seputan, a tributary of the Kaso, which flows into the Mahakam, could be reached in a day's march. This appears probable, for nowhere in this country are elevations of any great height to be seen. The Taman-Dyaks, who dwell on the Upper Kapuas, are more civilized than the Bahauss or the Kayans. Their women wear tasteful sarongs ornamented with beads and shells, and do not tattoo themselves, like the Kayan women.

EDUCATION IN GERMANY.¹

THE resolutions arrived at by the Conference on School Reform in Berlin may be summed up as follows:—

(1) Only two kinds of high schools are to survive,—gymnasias and non-Latin or non-classical schools (*oberrealschulen* and *höhere bürgerschulen*). A common lower school for gymnasias and non-Latin schools, so warmly advocated by many, is considered undesirable. The change from the one school to the other will be facilitated in every possible manner.

(2) The over-pressure, which is one of the most crying evils at the present time, is to be greatly reduced. A diminution of the hours devoted to Latin and Greek is considered possible, without any risk to the supremacy of classics. The Latin essay is to be abolished, as well as the Greek translation in the written examination for remove into the prima. German is to become the chief subject of instruction. Contemporary history is to be more thoroughly studied, without, however, adding to the hours assigned to history.

¹ From the *Scottish Geographical Magazine* for February, 1891.

¹ From the *London Journal of Education*.

(3) Especial stress is laid on the fact that home tasks are not to be increased; that the bulk of the work should be performed in school; and that, with this object in view, an alteration in the present method of teaching is absolutely necessary.

(4) For the teacher, more thorough pedagogic education and a higher social status are insisted on.

(5) Teachers should not be specialists, but form masters, and should realize their responsibility for the physical as well as the intellectual development of their pupils. Greater attention should be paid to the health of the boys, and to the demands of hygiene in the schools.

(6) The final school examination (which serves as entrance examination to the university) should be regarded as the "remove" examination out of the oberprima, and consequently should be restricted to work done in this class. The Latin essay is henceforth to be abolished, and the examination in other respects made considerably easier.

In order to meet the probable growing demand for höhere bürgerschulen and realschulen, the conference passed a number of resolutions, the most important of which were that gymnasia or realgymnasia, where only a small proportion of the pupils pass into the upper classes, should be turned into realschulen; that in towns where there are several gymnasia or realgymnasia, if possible, one of these should be turned into a realschule. In the establishment of new schools, preference is to be given to realschulen, but at the same time the interests of the minority of the inhabitants of small towns without gymnasia are to be considered by having Latin instruction given where desired in the three lowest classes, so that pupils who are intended for a gymnasium may be prepared for it without leaving their homes at too early an age.

The salaries of the teachers in the realschulen are to be on the same scale as those in the gymnasia.

It is thought likely that the demand for realschulen will increase, now that a leaving-certificate from a realschule qualifies for all the lower government posts, and for the one year's military service. There is to be a special examination for this privilege in the gymnasia at the end of the year in the unter secunda.

Another reform is the putting of gymnasia and realschulen on an equal footing with regard to the right of study for all degrees in the university and technical high schools (these are of the nature of technico-scientific universities). The only condition for realschule students is the completion of their leaving-certificate by certificates of their proficiency in classics, while gymnasium students must obtain certificates of proficiency in drawing and mathematics. Moreover, the school authorities have the right to excuse good pupils from the gymnasium or realschule this supplementary examination; also every candidate who has passed the final examination of a nine-class high-school shall be admitted to all state examinations, if, during his term of study, he passes the necessary special examination which he has omitted during his school career. It is these reforms which are really the most important, for they make it possible to carry out the proposed changes without injuring the interests of many classes.

The committee for the carrying-out of the reforms resolved upon in the conference held its first meeting in Berlin on Jan. 6. The committee consists of Geheimrath Hinzpeter as chairman; Dr. Schrader, curator of the Halle University, as vice-chairman; Dr. Fiedler of Breslau; Dr. Graf of Elberfeld; Dr. Kropatscheck of Berlin; Dr. Schlee, director of the Realgymnasium of Altona; and Dr. Uhlhorn of Hannover. The members of the Council for Education are not on the reform committee, but several of them are appointed to draw up the report. The committee agreed as to the reforms necessary for raising the social standing of the teacher, and on the conditions for the right to one year's military service. The next general meeting is to be held in February, and meanwhile the work of reform is to be furthered by private consultations.

Reforms have already been initiated in Württemberg gymnasia. They are divided into ten classes, of which Class I. is the lowest. The chief alteration is that Latin is to be begun in Class II. instead of Class I., in which the average age is eight. In the lowest class the time is to be spent in mastering reading, writing, and

the elements of arithmetic; also Greek is to be begun in the fifth, instead of the fourth, the average age of which is eleven. Then the time devoted to classics is to be curtailed in all classes, so that from the second to the sixth not more than ten hours, from the seventh to the tenth not more than eight hours, are given to classics in the week. This means a reduction from 102 hours to 82 hours in all the classes reckoned together. The number of school-hours is not to be diminished, but the time saved is to be given to other subjects. German is to have 28 hours as against 26, French 18 instead of 16, mathematics 39 instead of 37, physiography 16 instead of 10, and obligatory drawing in Classes IV. to VI. 7 hours, whereas before no time was devoted to this subject.

The chief feature of the reform programme is the emphasis laid on making grammar the handmaid of literature, on mastering the text, and gaining a knowledge of grammar by study of it rather than making grammar an aim in itself. The official publications point out the fact that these alterations are comparatively insignificant, and that the Württemberg educational authorities consider the time not yet ripe for extensive reforms, more especially as the resolutions passed by the Berlin School Conference really tend to make the gymnasia of Prussia more nearly resemble those of Württemberg. For instance: the gymnasium in Württemberg has no Latin essay, and the division of secondary schools into gymnasia and non-classical realschulen is already carried out.

LETTERS TO THE EDITOR.

**.* Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.*

The editor will be glad to publish any queries consonant with the character of the journal.

On request, twenty copies of the number containing his communication will be furnished free to any correspondent.

Discovery of Fish-Remains in Lower Silurian Rocks.

AT a meeting of the Biological Society of Washington on Feb. 7, 1891, Mr. Charles D. Walcott of the United States Geological Survey announced the discovery of vertebrate life in the Lower Silurian (Ordovician) strata. He stated that "the remains were found in a sandstone resting on the pre-paleozoic rocks of the eastern front of the Rocky Mountains, near Cañon City, Col. They consist of an immense number of separate plates of placogonoid fishes and many fragments of the calcified covering of the notochord, of a form provisionally referred to the *Elasmobranchii*. The accompanying invertebrate fauna has the facies of the Trenton fauna of New York and the Mississippi valley. It extends upward into the superjacent limestone and at an horizon 180 feet above the fish-beds. Seventeen out of thirty-three species that have been distinguished are identical with species occurring in the Trenton limestone of Wisconsin and New York.

"Great interest centres about this discovery from the fact that we now have some of the ancestors of the great group of placoderm fishes which appear so suddenly at the close of the Upper Silurian and in the lower portion of the Devonian groups. It also carries the vertebrate fauna far back into the Silurian, and indicates that the differentiation between the invertebrate and vertebrate types probably occurred in Cambrian time."

Mr. Walcott is preparing a full description of the stratigraphic section, mode of occurrence, and character of the invertebrate and vertebrate faunas, for presentation at the meeting of the Geological Society of America in August, 1891.

L. A.

Washington, Feb. 10.

Was Lake Iroquois an Arm of the Sea?

IN *Science* recently Professor Davis stated several reasons leading to the belief that the Iroquois beach was formed by a lake instead of being formed by the sea, as held by Professor Spencer. It is possible that both theories are partly right, and that there was once a lake overflowing the divide at Rome, while later the basin of Lake Ontario or its eastern portion was occupied by the sea. It is not my present purpose to enter into a general discussion of the question, but to call attention to a class of deposits

which appear not to have heretofore been described in connection with this question.

For instance: in the town of Schroepel, Oswego County, N. Y., and extending across the Oneida River (outlet of Oneida Lake) for several miles into Clay, Onondaga County, there is a plain of much rolled and rounded boulderets, cobbles, pebbles, gravel, and sand. Many of the stones, especially the larger ones, are composed of crystalline rocks from Canada. In the midst of the plain are numerous depressions, some of them containing one hundred acres or more. The deeper depressions are occupied by lakes without visible outlets, usually bordered by steep banks of sand or gravel up to seventy-five feet high. The smaller hollows present the well-known phenomenon of kettle-holes surrounded by reticulated kames, some of which are shown by excavations to have an anticlinal stratification. The coarser material is more abundant toward the north, and the sediments become finer in composition as we go south and south-eastward. At the same time the hollows become shallower, and the deposit expands somewhat in fan shape. Many of the shallower hollows contain swamps, once ponds, now peated over or filled with humus and silt often containing fresh-water shells. The plains of sand and gravel are bordered by broad plains of clay or silt. Some of the clays contain fresh-water shells; but my observations were made some years ago, and are not detailed enough to determine whether any of the fossiliferous clays are contemporaneous with the sand and gravel plains. Some of them are plainly later.

In Maine I have had opportunity to study scores of the deltas dropped by glacial rivers near where they entered the sea at a time it stood above its present level. They present the same proofs of a gradual stopping of the currents as are shown in the plain above described. The coarser fragments were first dropped as the rivers entered still water, and the assortment proceeded as their rate became slower, until at last the finest clay and rock-flour settled on the bottom of the water. The plain at the Oneida River has substantially the same structure as the deposits which I have described in Maine as deltas of glacial sediments: I therefore regard the plain as having been deposited by glacial rivers in still water in front of the ice, but not far from the ice-front. The assortment is more systematic, and takes place within less distance than is found in the frontal plain deposited in front of the ice on land sloping away from the glacier. This I regard as proof that the slopes of the land at that place were northward in glacial time, as they are at present. According to this interpretation, certain conclusions follow: 1. At a certain time the central part of the basin of Lake Ontario was still occupied by land-ice, which extended south to near the present Oneida River; 2. At this time south of the ice-front there was a body of open water, which at this place was fifteen or more miles wide; 3. The broad and deep sheets of gravel, sand, and clay which now cover the site of this open water are composed chiefly of the sediments of glacial rivers pouring from the north into still water, and dropping their burden.

If it be claimed that these sediments represent a sheet of glacial till which was eroded by the waves and re-deposited as aqueous sediment, then the material should grow finer as we go northward away from the Iroquois beach, whereas at the Oneida River we have the opposite arrangement. If it be claimed that these sediments were the result of wave-erosion of the solid rock, we have a right to demand that the system of beach-cliffs adequate to furnish so great a mass shall be pointed out to us. There are hundreds of square miles covered with sediments which in many places are known to be eighty or a hundred feet thick. The small amount of wave-erosion required to form the beach is in remarkable contrast with the scarp of erosion required by this theory. Moreover, any erosion hypothesis must assume a much greater erosion of the till than even the Atlantic was able to accomplish on the coast of Maine during its elevation in late glacial and post-glacial time. And if we suppose this drift to have its origin in any form of floating ice, how shall we account for the deep kettle-holes and reticulated ridges, or for the attrition which rounded the cobbles and boulderets in tracts extending at right angles to the beach, or for the horizontal assortment of the sediments, they growing finer as we go south? I see no admissible theory except that above stated.

It would appear that any hypothesis of the marine origin of the Iroquois beach must concede that the central part of the basin of Lake Ontario was still covered by land-ice at the time when a body of water ten to thirty miles broad lay to the south of the ice-front. Into this body of water great glacial rivers flowed, so that it was practically a body of fresh water, even if at sea-level.

In addition to the delta plain above described, there are in the region other deposits that are probably glacial sediments, but I have not examined the country lying east of the plain in question so systematically as to be certain. If a line of frontal deltas can be traced eastward and westward, it will enable us to map the ice-front of that period. The relation of such a series to the Iroquois beach, especially in the country situated north and north-east of Watertown, would greatly help to decide the question whether the body of water that lay south of the ice was a lake or an arm of the sea.

G. H. STONE.

Colorado Springs, Col., Feb. 5.

Rain-Formation.

IN your issue of Feb. 6 Professor Hazen has produced a table whereby it is intended to show that "on an average more than half the rain at Pike's Peak occurs with a falling temperature;" and from subsequent remarks in his letter it appears that the professor hereby means to say that the surface air grew gradually colder while this rain was falling, at which, to him, extraordinary result he expresses his surprise.

To an ordinary individual it may not seem surprising if rainfall should have the effect of lowering the temperature of the surface-air, when it is considered that the raindrops descend from colder upper regions, and in all probability generally first appear as snow-flakes, and also, though not so much, that the clouds prevent the sun from keeping up the temperature of the surface-air; but I shall allow myself to point out that whether the downpour has the effect of changing the temperature of the surface-air or not, cannot possibly be ascertained from observations at Pike's Peak or any other isolated station.

Let us take the case before us of rain having fallen at Pike's Peak for ten hours with a falling thermometer, and that the wind was blowing during that time at a rate of about twenty miles an hour. The surface-air which during the ten hours passes the station at Pike's Peak will then represent a body of air two hundred miles long; and when the rain set in it may have been located on lower land. The eleven readings of the thermometer give us, therefore, the temperature of air-bodies located at distances of twenty miles from one another, and taken, not all at the same moment, but at eleven different hours; and I should feel obliged to Professor Hazen if he would explain how it is possible to deduce from these readings whether the surface-air as such grew colder or warmer during the fall of rain.

It is probably from drawing inferences of this nature that the professor arrives at such apparent anomalies as when he makes the following amazing statement: "While it might be thought that a falling temperature in a saturated air would tend to produce rainfall, such is by no means the fact. There are many cases in which a fall of from ten to fifteen degrees of Fahrenheit has occurred in saturated air without any corresponding rainfall." Here is really no anomaly. The air which passed the place of observation was all saturated, and the air which came first had a temperature ten to fifteen degrees higher than the temperature of the air which afterwards passed by; but Professor Hazen infers that it was the same air he was examining all the time, and consequently wonders why it wouldn't rain when saturated air "got chilled."

FRANZ A. VELSCHOW, C.E.

Brooklyn, N. Y., Feb. 13.

BOOK-REVIEWS.

Social Diseases and Worse Remedies. By T. H. HUXLEY. New York, Macmillan. 16°. 30 cents.

THIS pamphlet contains a series of letters published a few weeks since in the London *Times*, criticising quite severely the scheme for relieving poverty devised by Mr. Booth, the "general" of the Salvation Army. In his first letter Mr. Huxley condemned the

scheme, partly because of its socialistic character, but mainly because in his opinion the Salvation Army was liable to degenerate into "a mere engine of fanatical intolerance and personal ambition." The publication of this letter, however, brought him a large amount of new information, some of it coming from persons that had been officers of the Salvation Army, and all tending to show that his apprehensions were amply justified. It appears that the officers are all under obligation, like the Jesuits, to "obey, without questioning or gainsaying, the orders from headquarters;" and it further appears from evidence that has not been questioned that large sums of money and other property originally contributed by the public have been "handed over to Mr. Booth and his heirs and assigns." This property is ostensibly held in trust, but Mr. Huxley shows that there is no legal obligation to that effect. He also criticises some of Mr. Booth's social theories, remarking that "with thrift and self-respect denounced as sin, with the suffering of starving men referred to the sins of the capitalist, the Gospel according to Mr. Booth may save souls, but it will hardly save society."

The result is, that Mr. Booth's schemes are unqualifiedly condemned, while at the same time the author of the letters shows that he realizes the misery of the poor, and the danger it threatens to society, as fully as any one. Indeed, he seems to us to exaggerate the social danger, remarking that "unless this remediable misery is effectually dealt with, the hordes of vice and pauperism will destroy modern civilization as effectually as uncivilized tribes of another kind destroyed the great social organization which preceded ours." He also reprints an essay published in a magazine in 1888, in which he takes a very pessimistic view of the problem of poverty; but the only remedy he proposes is technical education, which to our mind is altogether inadequate. The whole pamphlet, however, is very interesting, and should be read by every one who is concerned for the welfare of the laboring poor.

AMONG THE PUBLISHERS.

THE American Academy of Political and Social Science will shortly issue a translation of Professor Meitzen's work on statistics. English literature on this subject is so meagre, that every one interested either in its theoretical or practical aspects will be glad to learn of this accession to our stock of scientific material. Dr. R. P. Falkner of the University of Pennsylvania has made the translation.

—"Therapeutic Sarcognomy: a New Science of Soul, Brain, and Body," is the title of a forthcoming work from the house of the J. G. Cupples Company, Boston. The author is Professor J. R. Buchanan.

—In the *Illustrated American* for the week ending Feb. 21 there are illustrations of some of the treasures, in the way of old books and bric-a-brac, that are contained in the collection of Mr. Brayton Ives, about to be sold.

—"Liberty in Literature" is the title of a small volume, well printed and neatly bound, recently published by the Truth-Seeker Company of this city. It is an address delivered by Robert G. Ingersoll at Horticultural Hall, Philadelphia, on Oct. 21, 1890, on the occasion of a testimonial to Walt Whitman. A portrait of the aged "good gray poet" illustrates the volume.

—N. D. C. Hodges, 47 Lafayette Place, New York, has now in press a work by Dr. Daniel G. Brinton, entitled "The American Race: a Linguistic Classification and Ethnographic Description of the Native Tribes of North and South America." It is the first attempt ever made to classify all the Indian tribes by their languages, and it also treats of their customs, religions, physical traits, arts, antiquities, and traditions. The work comprises the results of several years of study in this special field.

—Professor Morey of Rochester University, the author of "Roman Law," has submitted a paper to the American Academy of Political and Social Science on "The Genesis of our Written Constitutions," which will shortly be issued by that body. He attempts to show, that, so far from Mr. Gladstone's famous words relating to the origin of the Constitution of the United States

being true, that instrument was a legitimate development of the Constitution of the Colonies then existing, which in their turn had grown out of the charters of the old trading-companies.

—"The Harpur Euclid," just published by Rivington of London, and Longmans, Green, & Co., of New York, is an edition of Euclid's "Elements" revised in accordance with the reports of the Cambridge Board of Mathematical Studies and the Oxford Board of the Faculty of Natural Science. It is the joint production of Edward M. Langley, M.A., and W. Seys Phillips, M.A. The work is intended to be strictly a school edition of Euclid. While retaining his sequence of propositions, and basing their proofs entirely on his axioms, the editors have not scrupled to replace some of his demonstrations by easier ones, and to discard whatever they considered superfluous or unnecessary. A good feature of the miscellaneous exercises given in the volume is that they are taken from widely different sources; some being original, others taken from examination-papers, and still others being well-known theorems or problems given by most writers on the same subject.

—The late work of Henry M. Howe (son of Julia Ward Howe) on "The Metallurgy of Steel" has met with pronounced success. It has been warmly commended by many of the scientific journals of Europe. We quote some of their opinions: "This work promises to become a classic. With a lucid style it combines thorough comprehension of the subject and a wise conciseness," says the *Colliery Guardian*, London. Other authoritative opinions are as follows: "It is not only the most beautiful book ever published about steel, but certainly, also, the most complete and profound" (*Revue Universelle des Mines*, Liege, Belgium). "We fully endorse and recommend it to the German metallurgists as one of the most important contributions in modern times to the siderometallurgical science" (*Berg-und Huettenmaennische Zeitung*, Berlin, Germany). "This stately quarto is the most exhaustive yet written on the subject" (Professor Ledebur, Freiberg, Germany). "It is so easily and so far in advance of any thing that has ever been published on iron, that it marks an epoch in the literature of the subject" (Professor Drown, Institute of Technology, Boston).

—In the *Atlantic* for March, in an autobiographic fragment entitled "My Schooling," we are told of James Freeman Clarke's early educational training. "The State University in America," by George E. Howard, advocates the establishment of universities in each State, which shall be universities in something more than name, and the relegation of the many colleges of insufficient means to a grade intermediate between the school and the university. A paper on "The Speaker as Premier," by Albert Bushnell Hart, is a timely consideration of a question which has been much before the public of late. Mr. Lowell continues his articles on travel in Japan. Perhaps the most valuable contribution to the number is Francis Parkman's first paper on the "Capture of Louisbourg by the New England Militia," an historical study of much importance, and with an incidental sketch of the Wentworth House, at New Castle, Maine, which is very charming. Miss Agnes Repplier, in an amusing and thoughtful paper called "Pleasure: A Heresy," appeals, not for more cultivation in life, but for a recognized habit of enjoyment. The article is full of good-natured banter at the expense of the self-consciously cultivated persons, who demand from both literature and art, not pleasure, but some serious moral purpose.

—Mark Brickell Kerr, topographer of the National Geographic Society's expedition to Mount St. Elias in the summer of 1890, will describe the adventures and discoveries of that exploration in the March *Scribner*. The results of his study of glaciers are especially valuable, as well as the determination of a new measurement for the altitude of this famous Alaskan mountain. Samuel Parsons, jun., superintendent of parks for New York City, who has done so much to beautify the public fountains with rare water-lilies, papyrus, and lotus, will describe the practical means of ornamenting ponds and lakes in the same number. This article will especially interest people with small places in the country, having natural streams and ponds upon them.

—In *The Chautauquan* for March, 1891, we note the following contributions: "The Intellectual Development of the English

People," by Edward A. Freeman; "England after the Norman Conquest," Part III., by Sarah Orne Jewett; "The English Towns," III., by Augustus I. Jessopp, D.D.; "The United States of the Pacific," by Fred. Perry Powers; "Coxcomb and Coquette in Tudor Times," by James A. Harrison, LL.D.; "Social Reform and the Socialists," by Robert Ellis Thompson, D.D.; "Studies in Astronomy," VI., by Garrett P. Serviss; "Singapore," by Rev. W. F. Oldham, D.D.; "Dr. Koch and Consumption," by J. P. Hassler, M.D.; "Politics and Politicians," by Judge Frederick G. Gedney; "The Story of the Opium Curse in India," by Bishop John F. Hurst, LL.D.; "The Woman's World of London," by Elizabeth Robbins Pennell; "How Marriage affects a Woman's Property," by Lelia Robinson Sawtelle, LL.B.; and "To What Kingdom does Woman belong?" by Kate C. Bushnell, M.D.

— C. W. Bardeen of Syracuse sends us a small pamphlet entitled "Tiedemann's Record of Infant Life." It is from the French translation of a German work, with a commentary interwoven by M. Michelan, the English version being by Bernard Perez. The original author, who lived about a century ago, records in this work his observations of his own son in the first two years of his life, noting down many points that will be interesting to those who are engaged in similar researches. The phenomena of childhood, as thus recorded by him, differ in many respects from those noticed by Darwin and other recent observers,—a fact which

shows that caution is necessary in generalizing from such observations; but we cannot enter into particulars here. Mr. Bardeen also sends us three papers read before the National Educational Association at St. Paul in July last. One is by himself, on the "Effect of the College Preparatory High School upon Attendance and Scholarship in the Lower Grades," in which he takes the ground that the maintenance of a classical course in the public high schools helps to raise the whole tone of the school, and is therefore useful even to those who take the English course. He does not quite make clear, however, how the requisite classical scholarship can be secured without beginning the course before the usual age for entering the high school. Another of the papers is by W. H. Maxwell, on "Examinations as Tests for Promotion," in which he repeats the well-worn arguments in favor of examinations, but without offering any thing new, and showing, as it seems to us, an insufficient sense of the abuses to which examinations are apt to lead. Mr. Henry Sabin, State superintendent of Iowa, treats of "Organization and System vs. Originality and Individuality," taking strong ground against the mechanical system of teaching and school organization now so much in vogue as injurious to both teacher and pupil. All the papers have merit; but we cannot help thinking that the authors might have done better if they had taken a little more pains.

— J. B. Lippincott Company announce as in press "The Design of Structures: A Practical Treatise on the Building of Bridges,

Publications received at Editor's Office,
Feb. 9-14.

- AGRICULTURAL Experiment Station. Ithaca, N. Y. Third Annual Report of the, 1890. Ithaca, Cornell Univ. 187 p. 8°.
- ELECTRIC Railways and Systems in Operation, Maps of the United States, showing the Central Station Plants and. Boston, Thomson-Houston Electric Co. 110 p. f°.
- HARVARD COLLEGE, Annals of the Astronomical Observatory of. Vol. XXVII. The Draper Catalogue of Stellar Spectra photographed with the 8-inch Bache Telescope as a Part of the Henry Draper Memorial. Cambridge, John Wilson & Son. 388 p. 4°.
- HOERNES, A. H. Mixed Metals or Metallic Alloys. London and New York, Macmillan. 384 p. 16°. \$1.50.
- HUXLEY, T. H. Social Diseases and Worse Remedies. London and New York, Macmillan. 128 p. 16°. 30 cents.
- PICKERING, E. C. Forty-fifth Annual Report of the Director of the Astronomical Observatory of Harvard College for the Year ending Oct. 31, 1890. Cambridge, Harvard Univ. 12 p. 8°.
- PICKERING, E. C., and WENDELL, O. C. Annals of the Astronomical Observatory of Harvard College. Vol. XXIII. Part I. Discussion of Observations made with the Meridian Photometer during the Years 1882-88. Cambridge, John Wilson & Son. 136 p. 4°.

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Roofs, etc.," by S. Anglin; "An Introduction to the Study of Metallurgy," by C. Roberts Austen, C.B., F.R.S.; "Chambers's Encyclopædia," Vol. VII. (entirely new edition, revised and rewritten); "The Old Navy and the New," by Rear-Admiral Daniel Ammen, U.S.N.; "Tables for the Determination of Minerals," by Persifor Frazer, jun., A.M. (new edition, revised and enlarged); "Aids in Practical Geology," by G. A. J. Cole, F.G.S.; "Historic Note-Book," by the Rev. E. Cobham Brewer, LL.D., Trinity College, Cambridge; and "Regional Anatomy in its Relation to Medicine and Surgery," by George McClellan, M.D. (illustrated from photographs taken by the author of his own dissections, expressly designed and prepared for this work, and colored by him after nature).

—The next number of the "Publications of the American Academy of Political and Social Science" will consist of an address on "Municipal Government and Public Health," by the eminent editor of the *Index Medicus*, Dr. John S. Billings, of the

United States Army. The author sets forth in a clear way the proper municipal organization of health. Every city councilman in the country, as well as every other citizen interested in this important subject, should read this paper.

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